Simulation Exam **Name:** **University of the Ryukyus**
3-rd year undergraduate **No:** **Faculty of Engineering**
2008-2-18 Last Term Examination **Department of Information Eng.**
Time: 90 minutes (write answers in boxes) **Prof. M.R. Asharif**
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1- **If the sequence x(n) has the following properties:**

x(0)=0, x(1)=x(2)=1

where: ***x(n)=x(n-1)+x(n-2)-x(n-3)*** ***for n>=3***

Then, find x(100), by regression or simulation method. *10%*

x(100) =

2- **In randomised response technique (RRT), if we have:**

Pr[Yes]=0.7 (total probability from survey).

Pr[Yes|N]=0.8 (answering probability to non-embarrassing question).

Pr[Yes| E]=0.3 (answering probability to embarrassing question).

Find: 1-p_0 **(**condition for answering to embarrassing question).

(Hint: See page 51)

10%

$1-p_0$ =

3- **In the following chaotic system:** *10%*

x(n+1)=4 r x(n) [1-x(n)]

If *r=0.7*, find the attractor of this chaotic system by simulation or direct computation.

(*Hint: See chap. 6*

x(∞)=

4- **Simulate the normal distributed random variables *(N1, N2)* by using Box-Muller method from the following pair of uniform distributed random variables: *(U1,U2)=(0.9,0.2)*** *(Hint: See page 78 use Eq. 4.1)*

10%

(N1,N2)=

5- Simulate the Gamma distributed random variables, *G*, with $\Gamma(n,\lambda)$ for *n=4,* $\lambda = 0.25$ from the following uniform distributed random variables, *U(0,1):*
U1=0.80, U2=0.90, U3=0.71, U3=0.72 *10%*

(*Hint: See page 82*)

G=

6- Two independent uniform random numbers with U(0,1) are given in the binary form as below: U1=0.01010110

U2=0.11010101

Simulate the binomial distribution B(8,1/2) random variables, X1, from U1 and X2, with B(8,1/4) from U1 and U2. *10%*

(*Hint: See page 83*)

X1=
X2=

7- Simulate a Poisson distribution random variable, K, with parameter $\lambda = 0.9$ from the following uniform random variables:
U1= 0.9, U2= 0.7, U3= 0.8, U4= 0.4 *(Hint: See page 84)*

10%

K=

8- Simulate random variable *X* with geometric distribution and *p=0.3* from *U(0,1)=0.7*

(Hint: See page 93 Eq. 5.4)

10%

X=

9- Use the table-look-up method to simulate random variables *X* from *U(0,1).*
Where the p.d.f of *X* has Caushy distribution as follows:

f(x)=1 /π(1+ x ^{2}), ***-∞< x<∞*** *10%*

Also, find the value of *X* when *U=0.75*

(Hint: see page 95-96)

X=
X|u=0.75 =

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